WHAT IS CLAIMED IS:

1. A method of generating a varying potential across a membrane of a closed membrane structure in which the membrane contains a first fluid, comprising:

suspending the structure in a second fluid;

applying an electric field to the second fluid; and

moving the suspended structure in the second fluid through the electric field by non-ionic transport to induce a varying potential across the membrane.

2. A method of generating a varying potential across a membrane of a closed membrane structure in which the membrane contains a first fluid, comprising:

suspending the structure in a second fluid;

applying a DC electric field to the second fluid; and

moving the suspended structure in the second fluid through the DC electric field by non-ionic transport means to induce a varying potential across the membrane.

3. A method of generating a varying potential across a membrane of a closed membrane structure in which the membrane contains a first fluid, comprising:

suspending the structure in a second fluid;

applying a varying electric field to the second fluid; and

moving the suspended structure in the second fluid through the varying electric field by non-ionic transport to induce a varying potential across the membrane.

4. A method of generating a varying potential across a membrane of a closed membrane structure in which the membrane contains a first fluid, comprising:

suspending the structure in a second fluid;

applying an electric field to the second fluid; and

moving the second fluid so as to move the suspended structure through the electric field by non-ionic transport to induce a varying potential across the membrane.

5. A method of generating a varying potential across a membrane of a closed membrane structure in which the membrane contains a first electrically conductive fluid, comprising:

suspending the structure in a second electrically conductive fluid;

applying an electric field to the second electrically conductive fluid; and

moving the suspended structure in the second electrically conductive fluid through the electric field by non-ionic transport to induce a varying potential across the membrane.

6. The method of claim 5, wherein the electric field comprises a DC electric field.

7. The method of claim 5, wherein the electric field comprises an AC electric field.

8. The method of claim 5, wherein the electric field comprises a varying electric field.

9. The method of claim 5, wherein the electric field is selected from the group consisting of a constant electric field, a pulsed electric field, a stepped electric field, a discontinuous electric field, and a continuous waveform electric field.

10. The method of claim 5, wherein the closed membrane structure comprises at least one of a cell, an intracellular organelle, a viral envelope, and a vesicle.

11. The method of claim 10, wherein the cell is selected from the group consisting of an animal cell, an insect cell, a plant cell, and a bacterial cell.

12. The method of claim 11, wherein the animal cell is selected from the group consisting of a CHO-K1 cell, a RIN cell, and a HEK-293 cell.

13. The method of claim 10, wherein the intracellular organelle is selected from the group consisting of a mitochondria, a lysosome, a nuclear envelope, an endoplasmic reticulum, a Golgi apparatus, and a chloroplast.

14. The method of claim 5, wherein the first conductive fluid is selected from the group consisting of cytoplasm, and a physiological buffer solution.

15. The method of claim 5, wherein the second conductive fluid comprises a physiological buffer solution.

16. The method of claim 5, wherein the second conductive fluid further comprises at least one of particulates, and viscosity modifiers.

17. The method of claim 5, wherein moving the closed membrane structure comprises at least one of rotating the closed membrane structure, turning the closed membrane structure, and translating the closed membrane structure.

18. The method of claim 5, wherein non-ionic transport for moving comprises at least one of mechanical agitation, sonication, differential pressure, gradients, and gravitation.

19. The method of claim 5, wherein moving the suspended structure comprises moving the suspended structure to induce a transmembrane potential that varies spatially over the membrane expanse.

20. The method of claim 5, wherein moving the suspended structure comprises moving the suspended structure to induce a transmembrane potential that varies temporally.

21. A method of detecting the functioning of a protein of a closed membrane structure in which the membrane contains a first fluid, comprising:

suspending the structure in a second fluid;

applying an electric field to the second fluid;

moving the suspended structure in the second fluid through the electric field by non-ionic transport to induce a varying potential across the membrane sufficient to cause a change in the functioning of the protein; and

detecting indication by a probe, wherein the probe indication is produced in response to the change in the functioning of the protein.

22. A method of detecting the functioning of a protein of a closed membrane structure in which the membrane contains a first fluid, comprising:

suspending the structure in a second fluid;

applying a DC electric field to the second fluid;

moving the suspended structure in the second fluid through the DC electric field by non-ionic transport to induce a varying potential

across the membrane sufficient to cause a change in the functioning of the protein; and

detecting indication by a probe, wherein the probe indication is produced in response to the change in the functioning of the protein.

23. A method of detecting the functioning of a protein of a closed membrane structure in which the membrane contains a first fluid, comprising:

suspending the structure in a second fluid;

applying a varying electric field to the second fluid;

moving the suspended structure in the second fluid through the varying electric field by non-ionic transport to induce a varying potential across the membrane sufficient to cause a change in the functioning of the protein; and

detecting indication by a probe, wherein the probe indication is produced in response to the change in the functioning of the protein.

24. A method of detecting the functioning of a protein of a closed membrane structure in which the membrane contains a first fluid, comprising:

suspending the structure in a second fluid;

applying an electric field to the second fluid;

moving the second fluid so as to move the suspended structure through the electric field by non-ionic transport to induce a

varying potential across the membrane sufficient to cause a change in the functioning of the protein; and

detecting indication by a probe, wherein the probe indication is produced in response to the change in the functioning of the protein.

25. A method of detecting the functioning of a protein of a closed membrane structure in which the membrane contains a first electrically conductive fluid, comprising:

suspending the structure in a second electrically conductive fluid;

applying an electric field to the second electrically conductive fluid;

moving the suspended structure in the second electrically conductive fluid through the electric field by non-ionic transport to induce a varying potential across the membrane sufficient to cause a change in the functioning of the protein; and

detecting indication by a probe, wherein the probe indication is produced in response to the change in the functioning of the protein.

26. The method of claim 25, wherein the electric field comprises a DC electric field.

27. The method of claim 25, wherein the electric field comprises an AC electric field.

28. The method of claim 25, wherein the electric field comprises a varying electric field.

29. The method of claim 25, wherein the electric field is selected from the group consisting of a constant electric field, a pulsed electric field, a stepped electric field, a discontinuous electric field, and a continuous waveform electric field.

30. The method of claim 25, wherein the closed membrane structure is selected from the group consisting of at least one of a cell, an intracellular organelle, a viral envelope, and a vesicle.

31. The method of claim 30, wherein the cell is selected from the group consisting of an animal cell, an insect cell, a plant cell, and a bacterial cell.

32. The method of claim 31, wherein the animal cell is selected from the group consisting of a CHO-K1 cell, a RIN cell, and a HEK-293 cell.

33. The method of claim 30, wherein the intracellular organelle is selected from the group consisting of a mitochondria, a lysosome, a nuclear envelope, an endoplasmic reticulum, a Golgi apparatus, and a chloroplast.

34. The method of claim 25, wherein the first conductive fluid is selected from the group consisting of cytoplasm, and a physiological buffer solution.

35. The method of claim 25, wherein the second conductive fluid comprises a physiological buffer solution.

36. The method of claim 25, wherein the second conductive fluid further comprises at least one of particulates, and viscosity modifiers.

37. The method of claim 25, wherein moving the closed membrane structure comprises at least one of turning the closed membrane structure, rotating the closed membrane structure, and translating the closed membrane structure.

38. The method of claim 25, wherein moving by non-ionic transport comprises at least one of mechanical agitation, sonication, differential pressure, gradients, and gravitation.

39. The method of claim 25, wherein moving the suspended structure comprises moving the suspended structure to induce a transmembrane potential that varies spatially over the membrane expanse.

40. The method of claim 25, wherein moving the suspended structure comprises moving the suspended structure to induce a transmembrane potential that varies temporally.

41. The method of claim 25, wherein the probe is selected from the group consisting of an endogenous probe, an exogenous probe, and combinations thereof.

42. The method of claim 25, wherein the probe indication is sensitive to at least one of the expression of a compound, the concentration of a compound, the presence of a compound, the translocation of a compound, the flux of a compound, the conformation of a compound, the activity of a compound, the environment of a compound, and the structure of a compound.

43. The method of claim 25, wherein the probe is situated in at least one of the first fluid, the second fluid, the exterior expanse of the membrane, the interior expanse of the membrane, and within the membrane.

44. The method of claim 25, wherein detecting indication by a probe comprises detecting at least fluorescence, luminescence, radiation, electrical current, atomic absorption spectroscopy, and mass spectroscopy.

45. The method of claim 25, wherein the probe is selected from the group consisting of an ion probe, a membrane potential probe, a probe sensitive to phosphorylation, a probe sensitive to enzymatic activity, and a probe sensitive to translocation between cellular compartments.

46. The method of claim 45, wherein the ion probe is selected from the group consisting of sodium ion probes, potassium ion probes, calcium ion probes, chloride ion probes, thallium ion probes, rubidium ion probes, lithium ion probes, hydrogen ion probes, bicarbonate ion probes, and nitrate ion probes.

47. The method of claim 45, wherein the membrane potential probe is selected from the group consisting of an oxonol derivative dye, a rhodamine derivative dye, a styryl derivative dye, a fluorescence resonance energy transfer probe, a GFP-type mutant, and a photoprotein.

48. The method of claim 25, wherein the membrane is selected from the group consisting of an extracellular membrane, an intracellular membrane, a vesicle membrane, and a synthetic membrane.

49. The method of claim 25, wherein the protein is selected from the group consisting of a protein located on the exterior expanse of the closed membrane structure, a protein located on the interior expanse of the closed membrane structure, a transmembrane protein, and an embedded protein.

50. The method of claim 25, wherein the protein is selected from the group consisting of a single protein, a collection of proteins, and a protein complex.

51. The method of claim 25, wherein the protein complex comprises more than one protein wherein the more than one protein may be the same or different.

52. The method of claim 25, wherein the protein is selected from the group consisting of an endogenously expressed protein, and an exogenously expressed protein.

53. The method of claim 25, wherein the protein is selected from the group consisting of an ion channel, an ion transporter, a receptor, a GPCR/7TM, a kinase, a phosphatase, and a protease.

54. The method of claim 53, wherein the ion channel is selected from the group consisting of a sodium ion channel, a potassium ion channel, a calcium ion channel, and a chloride ion channel.

55. The method of claim 53, wherein the ion channel is selected from the group consisting of a voltage-gated ion channel, a ligand-gated ion channel, and a mechanically-gated ion channel.

56. The method of claim 53, wherein the ion transporter is selected from the group consisting of an ion transporter which utilizes adenosine triphosphate energy directly, and an ion transporter which utilizes adenosine triphosphate energy indirectly.

57. A method of detecting the effect of an agent on the functioning of a protein of a closed membrane structure in which the membrane contains a first fluid, comprising:

suspending the structure in a second fluid;

applying an electric field to the second fluid;

adding the agent to the second fluid;

moving the suspended structure in the second fluid through the electric field by non-ionic transport to induce a varying potential across the membrane; and

detecting indication by a probe, wherein a probe indication is produced in response to the change in the functioning of the protein.

58. The method of claim 57, wherein the agent is selected from the group consisting of a compound, a peptide, and a protein.

59. The method of claim 57, wherein the electric field comprises a DC electric field.

60. The method of claim 57, wherein the electric field comprises an AC electric field.

61. The method of claim 57, wherein the electric field comprises a varying electric field.

62. The method of claim 57, wherein the electric field is selected from the group consisting of a constant electric field, a pulsed electric field, a stepped electric field, a discontinuous electric field, and a continuous waveform electric field.

63. The method of claim 57, wherein the closed membrane structure is selected from the group consisting of at least one of a cell, an intracellular organelle, a viral envelope, and a vesicle.

64. The method of claim 63, wherein the cell is selected from the group consisting of an animal cell, an insect cell, a plant cell, and a bacterial cell.

65. The method of claim 63, wherein the animal cell is selected from the group consisting of a CHO-K1 cell, a RIN cell, and a HEK-293 cell.

66. The method of claim 57, wherein the intracellular organelle is selected from the group consisting of a mitochondria, a lysosome, a nuclear envelope, an endoplasmic reticulum, a Golgi apparatus, and a chloroplast.

67. The method of claim 57, wherein the first conductive fluid is selected from the group consisting of cytoplasm, and a physiological buffer solution.

68. The method of claim 57, wherein the second conductive fluid comprises a physiological buffer solution.

69. The method of claim 57, wherein the second conductive fluid further comprises at least one of particulates, and viscosity modifiers.

70. The method of claim 57, wherein moving the closed membrane structure comprises at least one of turning the closed membrane structure, rotating the closed membrane structure, and translating the closed membrane structure.

71. The method of claim 57, wherein moving by non-ionic transport comprises at least one of mechanical agitation, sonication, differential pressure, gradients, and gravitation.

72. The method of claim 57, wherein moving the suspended structure comprises moving the suspended structure to induce a transmembrane potential that varies spatially over the membrane expanse.

73. The method of claim 57, wherein moving the suspended structure comprises moving the suspended structure to induce a transmembrane potential that varies temporally.

74. The method of claim 57, wherein the probe is selected from the group consisting of an endogenous probe, an exogenous probe, and combinations thereof.

75. The method of claim 57, wherein the probe indication is sensitive to at least one of the expression of a compound, the concentration of a compound, the presence of a compound, the translocation of a compound, the flux of a compound, the conformation of a compound, the activity of a compound, the environment of a compound, and the structure of a compound.

76. The method of claim 57, wherein the probe is situated in at least one of the first fluid, the second fluid, the exterior expanse of the membrane, the interior expanse of the membrane, and within the membrane.

77. The method of claim 57, wherein detecting indication by a probe comprises detecting at least fluorescence, luminescence, radiation, electrical current, atomic absorption spectroscopy, and mass spectroscopy.

78. The method of claim 57, wherein the probe is selected from the group consisting of an ion probe, a membrane potential probe, a probe sensitive to intracellular phosphorylation, and a probe sensitive to translocation between cellular compartments.

79. The method of claim 78, wherein the ion probe is selected from the group consisting of sodium ion probes, potassium ion probes, calcium ion probes, chloride ion probes, thallium ion probes, rubidium ion probes, lithium ion probes, hydrogen ion probes, bicarbonate ion probes, and nitrate ion probes.

80. The method of claim 78, wherein the membrane potential probe is selected from the group consisting of an oxonol derivative dye, a rhodamine derivative dye, a styryl derivative dye, a fluorescence resonance energy transfer probe, a GFP-type mutant, and a photoprotein.

81. The method of claim 57, wherein the membrane is selected from the group consisting of an extracellular membrane, an intracellular membrane, a vesicle membrane, and a synthetic membrane.

82. The method of claim 57, wherein the protein is selected from the group consisting of a protein located on the exterior expanse of the closed membrane structure, a protein located on the interior expanse of the closed membrane structure, a transmembrane protein, and an embedded protein.

83. The method of claim 57, wherein the protein is selected from the group consisting of a single protein, a collection of proteins, and a protein complex.

84. The method of claim 57, wherein the protein complex comprises more than one protein wherein the more than one protein may be the same or different.

85. The method of claim 57, wherein the protein is selected from the group consisting of an endogenously expressed protein, and an exogenously expressed protein.

86. The method of claim 57, wherein the protein is selected from the group consisting of an ion channel, an ion transporter, a receptor, a GPCR/7TM, a kinase, a phosphatase, and a protease.

87. The method of claim 86, wherein the ion channel is selected from the group consisting of a sodium ion channel, a potassium ion channel, a calcium ion channel, and a chloride ion channel.

88. The method of claim 86, wherein the ion channel is selected from the group consisting of a voltage-gated ion channel, a ligand-gated ion channel, and a mechanically-gated ion channel.

89. The method of claim 86, wherein the ion transporter is selected from the group consisting of an ion transporter which utilizes adenosine triphosphate energy directly, and an ion transporter which utilizes adenosine triphosphate energy indirectly.

90. An apparatus for generating a varying potential across a membrane of a closed membrane structure in which the membrane contains a first fluid, wherein the structure is suspended in a second fluid, comprising:

a fluid chamber containing the second fluid;

electrodes applying an electric field to at least a part of the fluid chamber; and

non-ionic transport means for moving the suspended structure in the second fluid through the electric field to induce a varying potential across the membrane.

91. An apparatus for generating a varying potential across a membrane of a closed membrane structure in which the membrane contains a first fluid, wherein the structure is suspended in a second fluid, comprising:

a first well containing the second fluid;

a second well;

a third well;

a fluid channel fluidly connecting the first well, the second well, and the third well;

electrodes for generating an electric field electrically connected to the fluid in the second well and in the third well;

a voltage source electrically connected to the electrodes;

a spinner in the first well;

a stirrer mechanism positioned under the first well; and

a detector for detecting indication by a probe.

92. An apparatus for detecting the functioning of a protein of a closed membrane structure in which the membrane contains a first fluid, wherein the structure is suspended in a second fluid, comprising:

a fluid chamber containing the second fluid;

electrodes applying an electric field to at least a part of the fluid chamber;

non-ionic transport means for moving the suspended structure in the second fluid through the electric field to induce a varying potential across the membrane sufficient to cause a change in the functioning of the protein; and

a detector for detecting indication by a probe, wherein the probe indication is produced in response to the change in the functioning of the protein.

93. An apparatus for detecting the effect of an agent on the functioning of a protein of a closed membrane structure in which the membrane contains a first fluid, wherein the structure is suspended in a second fluid, comprising:

a fluid chamber containing the second fluid;

electrodes applying an electric field to at least a part of the fluid chamber;

non-ionic transport means for moving the suspended structure in the second fluid through the electric field to induce a varying potential across the membrane; and

a detector for detecting indication by a probe, wherein the probe indication is produced in response to a change in the functioning of the protein.

94. The apparatus of claim 93, wherein the fluid chamber is a flow channel.

95. The apparatus of claim 93, wherein the fluid chamber comprises at least a part exposed to the electric field and a part for detecting indication by the probe.

96. The apparatus of claim 93, further comprising a voltage source.

97. The apparatus of claim 93, further comprising at least two electrodes connected to the voltage source.

98. The apparatus of claim 93, wherein the apparatus is a microfluidic apparatus.

99. The apparatus of claim 93, wherein the detector is selected from the group consisting of a fluorescence detector, a luminescence detector, a radiation

detector, a current detector, atomic absorption spectrometer, and mass spectrometer.

100. An apparatus for generating a varying potential across membranes of closed membrane structures in which the membranes contain a first fluid, wherein the structures are suspended in a second fluid, comprising:

a plurality of fluid chambers containing the second fluid;

at least two electrodes applying an electric field to at least a part of each of the plurality of fluid chambers; and

at least one non-ionic transport means for moving the suspended structures in the second fluid through the at least one electric field applied to at least a part of each of the plurality of fluid chambers to induce a varying potential across the membranes.

101. The apparatus of claim 100, wherein the at least two electrodes apply the same magnitude electric field to at least a part of each of the plurality of fluid chambers.

102. The apparatus of claim 100, wherein the at least two electrodes apply a different magnitude electric field to at least a part of each of the plurality of fluid chambers.

103. The apparatus of claim 100, wherein more than one electric field is applied to each of the plurality of fluid chambers.

104. The apparatus of claim 103, wherein the more than one electric field comprises a different magnitude electric field.

105. An apparatus for detecting the functioning of proteins of closed membrane structures in which the membranes contain a first fluid, wherein the structures are suspended in a second fluid, comprising:

a plurality of fluid chambers containing the second fluid;

at least two electrodes applying an electric field to at least a part of each of the plurality of fluid chambers;

at least one non-ionic transport means for moving the suspended structures in the second fluid through the at least one electric field applied to at least a part of each of the plurality of fluid chambers to induce a varying potential across the membrane sufficient to cause a change in the functioning of the protein; and

at least one detector for detecting indication by a probe, wherein the probe indication is produced in response to the change in the functioning of the proteins.

106. The apparatus of claim 105, wherein the at least two electrodes apply the same magnitude electric field to at least a part of each of the plurality of fluid chambers.

107. The apparatus of claim 105, wherein the at least two electrodes apply a different magnitude electric field to at least a part of each of the plurality of fluid chambers.

108. The apparatus of claim 105, wherein the more than one electric field comprises a different magnitude electric field.

109. The apparatus of claim 105, wherein the more than one detector comprises a different detector.

110. An apparatus for detecting the effect of an agent on the functioning of proteins of closed membrane structures in which the membranes contain a first fluid, wherein the structures are suspended in a second fluid, comprising:

a plurality of fluid chambers containing the second fluid;

at least one two electrodes applying an electric field to at least a part of each of the plurality of fluid chambers;

at least one non-ionic transport means for moving the suspended structures in the second fluid through the at least one electric field applied to at least a part of each of the plurality of fluid chambers to induce a varying potential across the membranes; and

at least one detector for detecting indication by a probe from each of the plurality of fluid chambers, wherein the probe indication is produced in response to a change in the functioning of the proteins.